MIDAM
CONTROL SYSTEM

MIDAM RUI84011

Room unit with Rn CO_2 PIR measurement

Communicative room sensor for temperature, relative humidity, radon, carbon dioxide and presence for easy sensing of these variables in rooms with variable or permanent occupancy. These values can be displayed to the user via a large LCD display. Communication via the open Modbus RTU protocol allows these controllers to be easily used and integrated into any open control system.

IRC

Aplication

- HVAC control systems in rooms with variable/permanent loads - offices, schools, theatres, auditoriums, residential houses, etc.
- General measurement of temperature, relative humidity, Rn and CO_2
- Wired integration into SCADA control systems

Function

The RUI84011 room sensor senses temperature, relative humidity, radon (Rn222) and CO_2 concentrations. The sensed and entered values are sent to the RS485 bus. The variant with display allows data (heating/cooling mode, fan stage, day/night/attenuation mode) from the parent system to be sent back to the room controller display to allow a variety of options during project construction. A variant with backlit display or without display and rotary knob (e.g. RUIxx099) is available upon request. The device measures radon activity in volume (VRA), radon decay products are filtered. The radon concentration measurement range is 200...3000 Bq/m^3. It is possible to set the concentration measurement in units of pCi/l. The CO_2 measurement range is 0...5000 ppm. A fraction of this value is converted using two parameters to a value of 0...100%, which is then shown on the display, e.g. 300...2500 ppm corresponds to 100...0% (air quality) or 0...100% (pollution). An absolute value in ppm is also available on the Modbus. The parameters are set using the configuration program supplied by the sensor manufacturer or by writing directly to the Modbus registers.The default values are 0%...350 ppm (clean air), 100%...2500 ppm (highest pollution). The device has factory set values to guarantee correct default operation and allows direct reading and writing of values to the Modbus map, which is available in a separate document. All settings are also stored in the modbus map directly in the device.

Initial radon concentration values

The first measured values of Rn222 concentration are available after one hour of operation. To achieve maximum measurement accuracy, it is necessary to leave the device in operation for at least one week.

CO_2 autocalibration function

Shocks during transport and aging can reduce the accuracy of the sensor. The sensor continuously monitors the minimum heading during operation and assumes that the CO_2 level drops to the outdoor air concentration (350 ppm) at least once every 8 days. The lowest measured value is then assigned a concentration of 400 ppm. The autocalibration algorithm does not work if the room is occupied continuously or if there is no drop in concentration (e.g. greenhouses). In this case, the function can be invoked by a configuration program or switched off directly by writing to the modbus table. By default, autocalibration is switched on. During the first few days of operation, i.e. until the first autocalibration, the sensor may show values that differ by several hundred ppm from the actual values, e.g. about 200 ppm at night, etc. This is automatically corrected with the first self-calibration.

SCADA system integration

The room sensor can be integrated directly via the RS485 communication bus (Modbus RTU).

Configuration

The device is configured using a tool supplied by the manufacturer or a standard modbus tool that is capable of modifying the relevant registers. In this way, different operating modes can be configured. Modifications to the room unit configuration can be made later without the need for special tools such as setpoints, deactivating or enabling buttons, functions, etc.

MIDAM RUI84011

Room unit with Rn CO_2 PIR measurement

Technical data

Power supply	24 V AC /DC ± 20%
Consumption	1 W
Communication	**RS485, Modbus RTU (slave) - for the master system (BMS)** supported baud rates 300...115 200 bps, settings can be made via Modbus RTU, default values are 9600, N, 8, 1, maximum bus length 1200 m, galvanic isolation 1 kV. Observe the polarity of the communication with the master PLC (terminals 8, 9) and proper bus termination.
Mechanical and dimensions	90x115x30 mm, Weight 0,15 kgs ABS body, IP20, standard colour RAL9010 4 x DIP switch (1x USR, 1x INIT, 2x BUS END) 9x screw clamp (female) for pins, recommended wire diameter 0,5 to 1,5 mm^2
Display	Reflective segment LCD 60x60 mm with backlight (see separate paragraph below)
Input	1x DI (internal) presence (PIR)
PIR measurement range	The PIR sensor is designed to detect people with an effective vertical sensor range of approx. 5 m (1.8 m), horizontal detection area is 70°(5.4 m bidirectional), range of motion 0.5 - 1.5 m/s.
T measurement range	-20 to +70 °C, ± 0,5 °C
rH measurement range	10 to 90% rH, ±3% rH
CO_2 measurement range	400 to 5000 ppm (optional output 0 - 100%)
CO_2 measurement method	NDIR (Non-dispersive Infra Red)
CO_2 measurement accuracy	±30 ppm, ±3% of the measured value (defined under the condition of at least 3 completed ACDL calibrations in the last 3 weeks). ACDL (automatic calibration in dimming light mode). CO_2 measurement response time (90%) 90 seconds, warm up time 2 minutes
Rn measurement range	Volumetric radon activity (VRA) 200 to 3000 Bq/m^3, measurement uncertainty 20% Display range 0 to 19,999 Bq/m^3, deviation ~10%/week (at 200 Bq/m^3)
Rn measurement method	Semiconductor sensor, alpha particle counting, passive diffusion chamber
Service life	Minimum 10-year lifespan with no need for recalibration.
Ambient conditions	+5 to +40 °C (IEC60721-3-3 3K22), 5 to 85 % relative humidity (non-condensing), air pressure 70 to 106 kPa
Compliance with standards	EMC 2014/30, EN IEC 61000-6-2:2019, EN IEC 61000-6-4:2019 LVD 2014/35, EN IEC 62368-1:2020

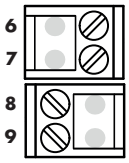
IRC

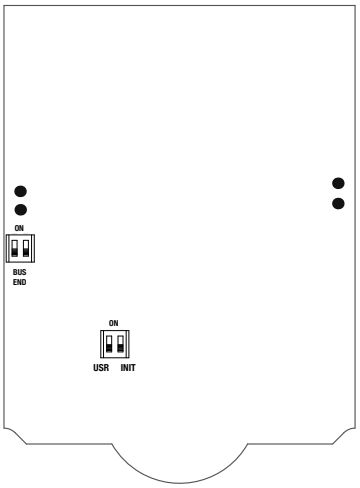
MIDAM RUI84011

Room unit with Rn CO_2 PIR measurement

Terminals and connection

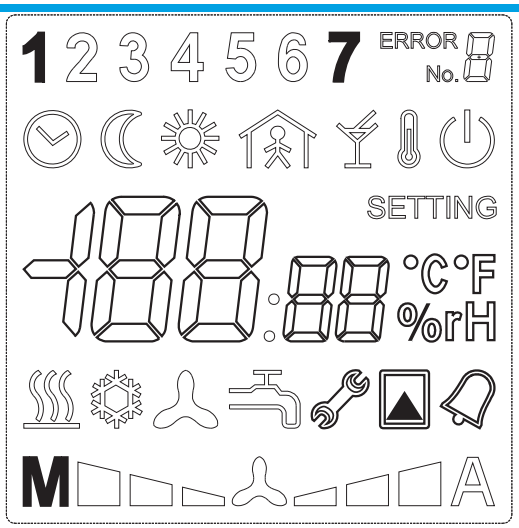
Clamps on the underside of the lid	
G0	Power supply
G	Power supply
K –	Serial line RS485 -; for master system
K +	Serial line RS485 +; for master system
Back side of the sensor (electronic part)	
BUS END	RS485 bus termination, the first and last devices on the bus should have the bus termination in the ON position.
USR	Not used.
INIT	In the ON position when the power is switched on, restore the default settings of the controller (address 1, communication parameters 9600/8/N/1).





Display

Large LCD display shows current temperature, humidity and fan coil values and status using segment symbols, standard symbols for day and night mode, time programs and activated output. Symbols at the top of the display indicate either the day of the week or cumulative historical values. The bell and side key symbols indicate a communication error within the RS485 bus, or an alert for over limit measurement values. For types that have a blue backlight function for the display and rotary knob, it is possible to set different brightness levels of 0-100% separately for the display and the knob. When an action is performed by the rotary knob, the dossit function is activated, which lights up the display and the knob for a defined time. All backlight functions can also be set directly from the master system.



Available versions

R-UI840-11	display, encoder/knob, T, rH, Rn, CO_2, PIR
R-UI800-11	display, encoder/knob, T, rH, Rn, CO_2
R-UI740-11	display, encoder/knob, T, rH, Rn, PIR
R-UI700-11	display, encoder/knob, T, rH, Rn

Changes in versions

10/2024	New datasheet version (v24/10).
08/2025	Service life information and Rn measurement updated (v25/08).

Subject to technical changes and General Terms and Conditions.